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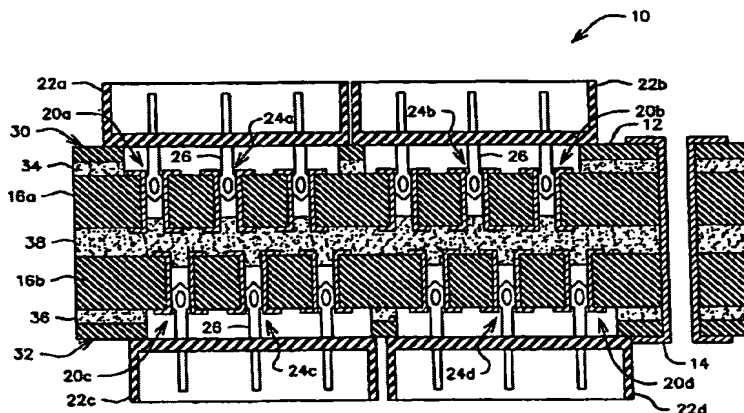
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**60/485,765** **8 July 2003 (08.07.2003)** **US**
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TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM,  
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[Continued on next page]

(54) Title: **METHOD FOR MANUFACTURING A MIDPLANE**



(57) **Abstract:** A method for manufacturing a mid-plane. a multi-layer board having a connection assembly is provided and a layer with a channel formed therein to define a perimeter of a connector area is provided. The layer is bonded to the multi-layer board such that the connector area overlaps the part of the connection assembly of the multi-layer board. At least a portion of the connector area in the layer is removed to expose the connection assembly of the multi-layer board. A rigid multilayer is also disclosed. The rigid multilayer includes a multilayer board and a layer. The multi-layer board has a connection assembly. The layer has a channel formed therein to define a perimeter of a connector area. The layer is bonded to the multi-layer board such that the connector area overlaps the connection assembly of the multilayer board. The connector area can then be removed such as by depth controlled routing. As will be understood by one skilled in the art, the depth tolerance is not critical because the layer is pre-formed with the channel prior to formation of the rigid multi-layer.

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 8245.072wo	<b>FOR FURTHER ACTION</b>	See item 4 below
International application No. PCT/IB2004/002560	International filing date ( <i>day/month/year</i> ) 08 July 2004 (08.07.2004)	Priority date ( <i>day/month/year</i> ) 08 July 2003 (08.07.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant HERMKENS, Gerald, A., J.		

1.	This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).																								
2.	This REPORT consists of a total of 8 sheets, including this cover sheet.  In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.																								
3.	<p>This report contains indications relating to the following items:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 15%; text-align: center;"><input checked="" type="checkbox"/></td> <td style="width: 35%;">Box No. I</td> <td style="width: 50%;">Basis of the report</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input checked="" type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input checked="" type="checkbox"/>	Box No. VI	Certain documents cited	<input checked="" type="checkbox"/>	Box No. VII	Certain defects in the international application	<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application
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<input checked="" type="checkbox"/>	Box No. VII	Certain defects in the international application																							
<input checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application																							
4.	The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).																								

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. +41 22 740 14 35	<table style="width: 100%; border: none;"> <tr> <td style="width: 100%;">Date of issuance of this report 09 January 2006 (09.01.2006)</td> </tr> <tr> <td>Authorized officer  <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Idhir Britel</div></td> </tr> <tr> <td>Telephone No. +41 22 338 70 60</td> </tr> </table>	Date of issuance of this report 09 January 2006 (09.01.2006)	Authorized officer  <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Idhir Britel</div>	Telephone No. +41 22 338 70 60
Date of issuance of this report 09 January 2006 (09.01.2006)				
Authorized officer  <div style="text-align: center; font-weight: bold; font-size: 1.2em;">Idhir Britel</div>				
Telephone No. +41 22 338 70 60				

# PATENT COOPERATION TREATY

REC'D 26 NOV 2004

WIPO PCT

From the  
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

3/1

## WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/IB2004/002560

International filing date (day/month/year)  
08.07.2004

Priority date (day/month/year)  
08.07.2003

International Patent Classification (IPC) or both national classification and IPC  
H05K7/14, H05K3/46, H05K3/00

Applicant  
HERMKENS, Gerald A.J.

### 1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☒ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

### 2. FURTHER ACTION

If a demand for International preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

### 3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized Officer

Batev, P

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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2004/002560

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2004/002560

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**Box No. II Priority**

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1. ☒ The following document has not been furnished:

- ☒ copy of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(a)).  
☐ translation of the earlier application whose priority has been claimed (Rule 43*bis*.1 and 66.7(b)).

Consequently it has not been possible to consider the validity of the priority claim. This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. ☐ It has not been possible to consider the validity of the priority claim because a copy of the priority document was not available to the ISA at the time that the search was conducted (Rule 17.1). This opinion has nevertheless been established on the assumption that the relevant date is the claimed priority date.
4. Additional observations, if necessary:

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**Box No. V Reasoned statement under Rule 43*bis*.1(a)(I) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-16
	No: Claims	none
Inventive step (IS)	Yes: Claims	1-16
	No: Claims	none
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	none

2. Citations and explanations

see separate sheet

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**Box No. VI Certain documents cited**

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1. Certain published documents (Rules 43*bis*.1 and 70.10)  
and / or
2. Non-written disclosures (Rules 43*bis*.1 and 70.9)  
see form 210

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/IB2004/002560

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

Reference is made to the following documents:

- D1: US 2002/181217 A1 (PATRICHE DORINEL) 5 December 2002 (2002-12-05)
- D2: EP-A-0 438 012 (IBM) 24 July 1991 (1991-07-24)
- D3: GB-A-2 101 411 (STANDARD TELEPHONES CABLES LTD) 12 January 1983 (1983-01-12)
- D4: US-A-5 869 356 (FULLER JR JAMES W ET AL) 9 February 1999 (1999-02-09)

1. The present invention relates to a method of manufacturing a mid-plane and a rigid multilayer, which is an intermediate product of said method.
2. The object of the invention is to provide a simplified and more reliable method of forming a connector area in the mid-plane.
3. The solution as proposed in claim 1 consists in bonding to a multi-layer board a layer with a channel formed therein to define a perimeter of a connector area. This channel prevents the bonding material from flowing into the connector area and facilitates the removing of the part of the layer covering the connector area since the depth tolerance, when cutting the layer along the channel, is not critical.
4. None of the cited documents, which reflect the technological background, discloses or gives an incitement to the above specific solution.

Documents D1 and D2 both relate to multi-layer mid-planes but do not disclose a method of providing a connector area.

Document D3, which is directed to a method of making a flexi-rigid circuit board, discloses (p. 1, l. 76 - 84) laminating a rigid sheet having grooves on the inner side to a multi-layer flexible structure, and cutting the sheet along the grooves to remove part of it. However, document D3 teaches that using such grooves has disadvantages and suggests an alternative method.

Document D4 discloses a method comprising, inter alia, a step of removing by controlled depth routing a part of an outer layer to expose a connector area.

In view of the available prior art, the subject matter of claim 1 is, therefore, novel and inventive.

5. Method claim 7, although drafted as independent, comprises all the steps of claim 1. Claim 13 is directed to a rigid multilayer comprising a multi-layer board and a layer with a channel formed therein to define a perimeter of a connector area bonded to the multi-layer board.

Claims 2 - 6, 8 - 12 and 14 - 16 define preferred embodiments of the invention and are dependent on claims 1, 7 and 13, respectively.

Thus, claims 2 - 16 also meet the requirements of the PCT in respect of novelty and inventive step.

#### **Re Item VI**

##### **Certain documents cited**

##### **Certain published documents**

Application No Patent No	Publication date (day/month/year)	Filing date (day/month/year)	Priority date (valid claim) (day/month/year)
US-A-20040108137	10/06/2004	21/07/2003	-

#### **Re Item VII**

##### **Certain defects in the international application**

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, no documents disclosing the relevant background art are identified in the description (see also the Guidelines, paragraph 4.05).

2. The features of the claims are not provided with reference signs placed in parentheses in order to facilitate their understanding (Rule 6.2(b) PCT, see also the Guidelines, paragraph 5.11).

#### **Re Item VIII**

##### **Certain observations on the international application**



1. The number of independent claims seems unreasonable with respect to the nature of the invention which the applicant seeks to protect (Rule 6.1(a) PCT). It appears that method claim 7 comprises all the steps of claim 1. However, claim 7 is not formulated as a dependent claim (Rule 6.4 PCT).

Lack of clarity of the claims as a whole arises, since the plurality of claims directed to the same subject matter makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

The requirements of Article 6 PCT regarding conciseness and clarity are, therefore, not met (see also the Guidelines, paragraph 5.42).

2. It is clear from the description (see e.g. p. 4) and figures 3 - 6 that the channel is provided in the inner side of layer, i.e. the side facing the multi-layer board.

Since independent claims 1, 7 and 13 do not contain this feature, they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

3. The last part of the description (paragraph 27) implies that the subject-matter for which protection is sought may be different to that defined by the claims. This results in lack of clarity of the claims (Article 6 PCT) when the description is used to interpret them (see the Guidelines, paragraph 5.30).

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